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(21)Application number : 10-010320	(71)Applicant : SANYO ELECTRIC CO LTD
(22)Date of filing : 22.01.1998	(72)Inventor : YANASE HIDEJI

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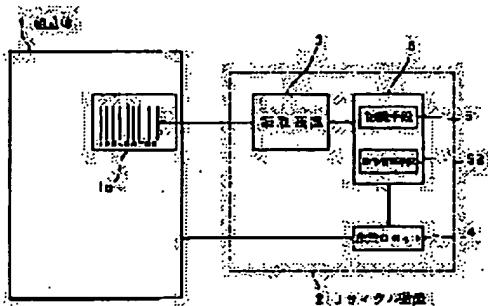
## (54) ASSEMBLY AND RECYCLING DEVICE

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide an assembly and a recycling device which enable a user to easily perform disjointing and classifying required for recycling without expert knowledge.

**SOLUTION:** An assembly 1 consists of plural parts, and recycle information like a discrimination number peculiar to the assembly and disjointing procedures is declared in its required position. Recycling information declared on this assembly 1 is read with a reader 3 of a recycling device 2, and the assembly 1 is automatically disjointed based on this read information by a working robot 4 of the recycling device 2, and disjointed parts are classified by materials.

Teaches Automatic / Robotic disassembly of Electronic Equipment, for the purpose of Recycling.




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## CLAIMS

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### [Claim(s)]

[Claim 1] The assembly which is an assembly which consists of two or more parts, and is characterized by what demolition procedure information peculiar to an assembly is written for by the necessary position as recycling information.

[Claim 2] The assembly which is an assembly which consists of two or more parts, and is characterized by what identification information peculiar to an assembly is written for by the necessary position as recycling information.

[Claim 3] The assembly characterized by what it has for an information maintenance means which consists of two or more parts by which are an assembly and demolition procedure information peculiar to an assembly is beforehand held as recycling information.

[Claim 4] The control means which it is [ control means ] the assembly which consists of two or more parts, and performs necessary functional operation, and perform the aforementioned necessary functional operation, An information maintenance means by which demolition procedure information peculiar to an assembly is beforehand held as recycling information, The assembly characterized by what it has a response means to read the recycling information to which the aforementioned control means answer instructions from an external instrument, and are held for the aforementioned information maintenance means including an interface means to send and receive information between external instruments, and to output to the aforementioned external instrument for.

[Claim 5] Recycling equipment which is characterized by providing the following and which disassembles an assembly according to claim 1 A demolition means to disassemble an assembly An information maintenance means by which demolition procedure information peculiar to an assembly is beforehand held by making identification information of two or more kinds of each assembly into an index An input means to input recycling information peculiar to an assembly Control means which control operation of the aforementioned demolition means while extracting the information which corresponds from the aforementioned information maintenance means based on the input by the input means and recognizing the demolition procedure of an assembly

[Claim 6] Recycling equipment which is characterized by providing the following and which disassembles an assembly according to claim 1 and classifies the disassembled parts according to a material A demolition means to disassemble an assembly A transfer work means to transport each part article disassembled with the demolition means to a necessary place An information maintenance means by which demolition procedure information peculiar to an assembly and the material information on assembly component part each are beforehand held as recycling information by making identification information of two or more kinds of each assembly into an index An input means to input identification information peculiar to an assembly, and control means which extract the information which corresponds from the aforementioned information maintenance means based on the input by the input means, recognize the transfer place classified by material of the demolition procedure of an assembly, and an assembly component part, and control operation of the aforementioned demolition means and a transfer work means

[Claim 7] Recycling equipment characterized by what the aforementioned input means is what inputs information by human operations, such as a keyboard and a voice recognition unit, in recycling equipment according to claim 5 or 6.

[Claim 8] Recycling equipment characterized by what the aforementioned input means is what reads information using light or the MAG in recycling equipment according to claim 5 or 6.

[Claim 9] Recycling equipment characterized by including a demolition means to be recycling equipment which disassembles an assembly according to claim 2, and to disassemble an assembly, a reading means to read recycling information peculiar to an assembly, and the control means that recognize the demolition procedure of an assembly based on the reading information by the reading means, and control operation of the aforementioned demolition means.

[Claim 10] Recycling equipment which is characterized by providing the following and which disassembles an assembly according to claim 2 and classifies the disassembled parts according to a material A demolition means to disassemble an assembly A transfer work means to transport each part article disassembled with the demolition means to a necessary place A reading means to read recycling information peculiar to an assembly Control means which recognize the transfer place classified by material of the demolition procedure of an assembly, and an assembly component part based on the reading information by the reading means, and control operation of the aforementioned demolition means and a transfer work means

[Claim 11] The recycling equipment characterized by to be included a demolition means are recycling equipment which disassembles the assembly of a publication to either of the claims 3 or 4, and disassemble an assembly, the read-out means which reads the information for recycling from the information maintenance means with which an assembly is equipped, and the control means which recognize the demolition procedure of an assembly based on the read-out information by the read-out means, and control operation of the aforementioned demolition means.

[Claim 12] Recycling equipment which is characterized by providing the following and which disassembles the assembly of a publication to either of the claims 3 or 4, and classifies the disassembled parts according to a material A demolition means to disassemble an assembly A transfer work means to transport each part article disassembled with the demolition means to a necessary place The read-out means which reads recycling information from the information maintenance means with which an assembly is equipped Control means which recognize the transfer place classified by material of the demolition procedure of an assembly, and an assembly component part based on the read-out information by the read-out means, and control operation of the aforementioned demolition means and a transfer work means

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to recycling equipment at an assembly row. An assembly means an electrical machinery and apparatus, a machine device, etc.

[0002]

[Description of the Prior Art] Although the disposal of the home electronics represented by the former, for example, a washing machine, a television receiver, the word processor, etc. is carried out by the life etc., except for expensive parts, an abandonment processor grinds finely, and destroys by fire, or is reclaiming land from the product by which the disposal was carried out.

[0003] However, in recent years, it is important to recycle waste from the purpose which plans environmental protection. [In order to perform this recycling, a product is disassembled] each part article is classified according to materials, such as synthetic-resin material metallurgy group material, and the things of the same material have classification \*\*\*\*\* out of synthetic-resin material metallurgy group material further.

[0004]

[Problem(s) to be Solved by the Invention] by the way, since composition and an assembly gestalt are different in many cases for every manufacture maker of the, if a product which was mentioned above has a know how with a great operator also neither about the demolition of a product, nor classifying according to material, the present condition is not progressing so that it may consider .. etc. .. the demolition and classification of a product by the abandonment processor are very difficult

[0005] Moreover, although the cure which displays the material on various the parts itself which constitutes a product, and makes a classification of each part article comparatively easy after product demolition is taken in recent years, about the work which disassembles a product, the fault which still left to the abandonment processor and was mentioned above remains.

[0006] Therefore, even if this invention does not have a know how, it aims demolition or a classification required for recycling the assembly row it enables it to perform easily at offer of recycling equipment.

[0007]

[Means for Solving the Problem] The assembly of the claim 1 of this invention consists of two or more parts, and demolition procedure information peculiar to an assembly is written by the necessary position as recycling information.

[0008] The assembly of the claim 2 of this invention consists of two or more parts, and identification information peculiar to an assembly is written by the necessary position as recycling information.

[0009] The assembly of the claim 3 of this invention consisted of two or more parts, and is equipped with an information maintenance means by which demolition procedure information peculiar to an assembly is beforehand held as recycling information.

[0010] The assembly of the claim 4 of this invention is what consists of two or more parts, and performs necessary functional operation. The control means which perform the aforementioned necessary functional operation, and an information maintenance means by which demolition procedure information peculiar to an assembly is beforehand held as recycling information, It has a response means to read the recycling information to which the aforementioned control means answer instructions from an external instrument, and are held for the aforementioned information maintenance means including an interface means to send and receive information between external instruments, and to output to the aforementioned external instrument.

[0011] The recycling equipment of the claim 5 of this invention is what disassembles the assembly of a publication to the above-mentioned claim 1. Identification information of a demolition means to disassemble an assembly, and two or more kinds of each assembly is made into an index. An information maintenance means by which demolition procedure information peculiar to an assembly is held beforehand, and an input means to input recycling information peculiar to an assembly, While extracting

the information which corresponds from the aforementioned information maintenance means based on the input by the input means and recognizing the demolition procedure of an assembly, the control means which control operation of the aforementioned demolition means are included.

[0012] The recycling equipment of the claim 6 of this invention is what disassembles the assembly of a publication to the above-mentioned claim 1, and classifies the disassembled parts according to a material. A demolition means to disassemble an assembly, and a transfer work means to transport each part article disassembled with the demolition means to a necessary place, An information maintenance means by which demolition procedure information peculiar to an assembly and the material information on assembly component part each are beforehand held as recycling information by making identification information of two or more kinds of each assembly into an index, The information which corresponds from the aforementioned information maintenance means based on the input by input means to input identification information peculiar to an assembly, and the input means is extracted. The transfer place classified by material of the demolition procedure of an assembly and an assembly component part is recognized, and the control means which control operation of the aforementioned demolition means and a transfer work means are included.

[0013] The recycling equipment of the claim 7 of this invention shall have inputted information for the aforementioned input means by human operations, such as a keyboard and a voice recognition unit, in the above-mentioned claims 5 or 6.

[0014] The recycling equipment of the claim 8 of this invention shall have read information for the aforementioned input means in the above-mentioned claims 5 or 6 using light or the MAG.

[0015] The recycling equipment of the claim 9 of this invention recognizes the demolition procedure of an assembly based on the reading information by demolition means to disassemble the assembly of a publication to the above-mentioned claim 2, and to disassemble an assembly, reading means to read recycling information peculiar to an assembly, and the reading means, and contains the control means which control operation of the aforementioned demolition means.

[0016] The recycling equipment of the claim 10 of this invention is what disassembles the assembly of a publication to the above-mentioned claim 2, and classifies the disassembled parts according to a material. A demolition means to disassemble an assembly, and a transfer work means to transport each part article disassembled with the demolition means to a necessary place, Based on the reading information by reading means to read recycling information peculiar to an assembly, and the reading means, the transfer place classified by material of the demolition procedure of an assembly and an assembly component part is recognized, and the control means which control operation of the aforementioned demolition means and a transfer work means are included.

[0017] The recycling equipment of the claim 11 of this invention recognizes the demolition procedure of an assembly based on the read-out information by demolition means to disassemble the assembly of a publication to the above-mentioned claims 3 or 4, and to disassemble an assembly, the read-out means which reads the information for recycling from the information maintenance means with which an assembly is equipped, and the read-out means, and contains the control means which control operation of the aforementioned demolition means.

[0018] The recycling equipment of the claim 12 of this invention is what disassembles the assembly of a publication to the above-mentioned claims 3 or 4, and classifies the disassembled parts according to a material. A demolition means to disassemble an assembly, and a transfer work means to transport each part article disassembled with the demolition means to a necessary place, Based on the read-out information by the read-out means which reads recycling information from the information maintenance means with which an assembly is equipped, and the read-out means, the transfer place classified by material of the demolition procedure of an assembly and an assembly component part is recognized, and the control means which control operation of the aforementioned demolition means and a transfer work means are included.

[0019] As mentioned above, in short, without troubling a help as much as possible, by this invention, the work of disassembling the assembly discarded or classifying the disassembled parts is devised so that it can carry out easily. The parts to recycle can be efficiently collected now by this, resources can be used effectively now, and the act which leads to environmental pollution of grinding indiscriminately the assembly discarded like before, and incinerating it, or reclaiming land from it can be lost now.

[0020]

[Embodiments of the Invention] It explains based on each operation form which shows the detail of this invention to drawing 1 or drawing 13.

[0021] Operation form 1 drawing 1 is the configuration block view in which starting the operation form 1 of this invention and showing an assembly and recycling equipment. The assembly from which one becomes a candidate for recycling, and 2 are recycling equipment among drawing.

[0022] The home electronics represented by the electrical machinery and apparatus which an assembly 1 consists of two or more parts, and was made to perform necessary functional operation, a machine device, for example, a washing machine, a television receiver, the word processor, etc. are mentioned. Written seal 1a is attached in the necessary position of this assembly 1. This recycling information is with the procedure of disassembling an assembly 1, and the information which shows the material of the component part of an assembly 1, and these information is written with gestalten, such as a bar code. Therefore, as the above-mentioned seal 1a, it can consider, for example as a bar code seal etc. According to amount of information, two or more seals may be used or a two-dimensional bar code with much amount of information may be used for this bar code.

[0023] Recycling equipment 2 is the composition containing a reader 3, a working robot 4, and a control unit 5.

[0024] A reader 3 reads the recycling information written by seal 1a of an assembly 1, and let it be a bar code reader etc.

[0025] A working robot 4 moves the disassembled each part article to the tray arranged in a necessary place while disassembling each part article of an assembly 1 (illustration ellipsis).

[0026] The control unit 5 is constituted by the microcomputer etc. and contains a recognition means 51 to recognize the demolition procedure of an assembly 1, and the disassembled transfer place of each part article based on the reading information by the reader 3, and the management tool 52 of operation which controls operation of a working robot 4 according to the demolition procedure and transfer place which have been recognized with the recognition means 51.

[0027] An operator reads first the recycling information written by seal 1a currently stuck on the assembly 1 used as the candidate for recycling, using a reader 3 as operation of such recycling equipment 2. Then, based on the reading information by the reader 3, recycling equipment 2 does demolition / transfer work automatically.

[0028] That is, a control unit 5 recognizes the reading information by the reader 3 by the recognition means 51, and controls operation of a working robot 4 by the management tool 52 of operation according to this demolition procedure and transfer place that have been recognized.

[0029] With such an operation gestalt 1, since the procedure of disassembling an assembly 1 to an assembly 1, and the information which shows the material of the component part of an assembly 1 are written, it is read with recycling equipment 2 and it is made to make a working robot 4 perform the demolition and part classifying of an assembly 1, an operator can recycle easily by not needing special knowledge only by what is necessary being just to be able to deal with a reader 3.

[0030] Operation form 2 drawing 2 is the configuration block view in which starting the operation form 2 of this invention and showing an assembly and recycling equipment. The feature of this operation form 2 is the ability to carry out self-recognition of the demolition procedure of an assembly 1, and be [ to have simplified the recycling information written to an assembly 1 only as a peculiar identification number, and ] made to perform demolition and classifying by the input of an identification number in recycling equipment 2A.

[0031] As for the assembly 1, seal 1a written by a part of the sheathing case is stuck. [ the identification number as recycling information ] In addition, you may make it make the sheathing case of an assembly 1 itself write directly, without being referred to as seal 1a.

[0032] Since recycling equipment 2A is the composition containing an input unit 10, a working robot 4, and a control unit 20 and the differences with the above-mentioned operation gestalt 1 are only an input unit 10 and a control unit 20, these are explained in detail.

[0033] It consists of a keyboard etc., the identification number as recycling information written by the assembly 1 by an operator's key stroke is inputted, and an input unit 10 outputs this identification number to a control unit 20.

[0034] Each identification number is made into an index. a microcomputer etc. constitutes a control unit 20 .. having .. \*\*\*\* .. the assembly 1 of various kinds .. The memory 21 the demolition procedure information on various assemblies 1 and the material information on assembly component part each that kinds differ are beforehand remembered to be, such as a flash memory and EEPROM, An extraction means 22 to extract the information which corresponds from memory 21 based on the input by the input unit 10, A recognition means 23 to recognize the transfer place classified by material of the demolition procedure of an assembly 1 and an assembly component part based on the extraction information by the extraction means 22, and the management tool 24 of operation which controls operation of a working robot 4 according to the demolition procedure and transfer place which have been recognized with the recognition means 23 are included.

[0035] As operation, when it recycles an assembly 1, the recycling information which an operator becomes from the identification number written by the assembly 1 from the input unit 10 is only inputted, and the

rest makes a demolition procedure and the disassembled classification place of parts recognize by the recycling equipment 2A side, and operates a working robot 4.

[0036] With such an operation gestalt 2, since the easy identification number is written to the assembly 1, it has by the recycling equipment 2A side, the material of the demolition procedure of an assembly 1 or an assembly component part is recognized and it is made to make a working robot 4 perform a demolition and part classifying, an operator can recycle easily by not needing special knowledge only by what is necessary being just to be able to perform simple key input operation.

[0037] Operation gestalt 3 drawing 3 is the configuration block view in which starting the operation gestalt 3 of this invention and showing an assembly and recycling equipment. The feature of this operation gestalt 3 is making information maintenance meanses, such as memory which made the assembly 1 memorize recycling information in the manufacture stage, equip, and making it read from the information maintenance means of an assembly 1 by recycling equipment 2B.

[0038] The assembly 1 has the composition of having the memory 13 by which demolition procedure information peculiar to an assembly 1 is beforehand remembered to be a means 11 of operation to perform mechanical or electric functional operation, and the control unit 12 which controls functional operation of this means 11 of operation as recycling information, such as a flash memory and EEPROM, and the interface means 14 for connecting with recycling equipment 2B as an external instrument so that it may illustrate. The above-mentioned control unit 12 consists of microcomputers etc., and has the management tool 121 of operation which controls functional operation by the means 11 of an assembly 1 of operation, and a response means 122 to send and receive information between recycling equipment 2Bs through the interface means 14.

[0039] On the other hand, recycling equipment 2B is the composition containing an interface device 30, a working robot 4, and a control unit 40 so that it may illustrate. The control unit 40 is constituted by the microcomputer etc., recognizes the transfer place classified by material of the demolition procedure of an assembly 1, and an assembly component part based on the read-out information by the read-out means 41 which reads recycling information from the memory 13 with which an assembly 1 is equipped, and the read-out means 41, and has the management tool 42 of operation which controls operation of a working robot 4.

[0040] As operation, when it recycles an assembly 1, the interface device 30 of recycling equipment 2B is connected to the interface means 14 of an assembly 1, recycling information is read from the memory 13 of an assembly 1 by the read-out means 41 of recycling equipment 2B, and operation of a working robot 4 is controlled by the management tool 42 of recycling equipment 2B of operation based on this recycling information.

[0041] With such an operation gestalt 3, the reading work and the input of recycling information like the above-mentioned operation gestalten 1 and 2 are unnecessary, and since what is necessary is just to only connect an assembly 1 and recycling equipment 2B, pre-preparation of demolition can be simplified.

[0042] Although various operation gestalten were shown above, the example of demolition of the assembly 1 by the working robot 4 is explained here. As an assembly 1, a washing machine as shown in drawing 4 is mentioned as an example, and the demolition procedure is shown in drawing 5 or drawing 13.

[0043] In drawing 4, 60 shows the whole washing machine and is in the state which removed the top cover which is not illustrated. 61 -- for a base board and 64, as for an outside tub and 66, a soldier and 65 are [ a sheathing case and 62 / an upper surface board and 63 / a dehydration tack and 67 ] motors

[0044] (a) By removing the pin which is not illustrated, remove the top cover made of synthetic resin which is not illustrated from the upper surface board 62, and transport to the recovery place of synthetic resin.

[0045] (b) As shown in drawing 5, by loosening a screw thread 70, remove the upper surface board 62 made of synthetic resin from the sheathing case 61, and transport to the recovery place of synthetic resin.

[0046] (c) As shown in drawing 6, by loosening a screw thread 71, remove the base board 63 made of synthetic resin from the sheathing case 61, and transport to the recovery place of synthetic resin.

[0047] (d) As shown in drawing 7, remove the metal soldier 64 hooked on the sheathing case 61 and the outside tub 65, and transport to a mated recovery place.

[0048] (e) As shown in drawing 8, remove the metal sheathing case 61 from the outside tub 65, and transport to a mated recovery place.

[0049] (f) As shown in drawing 9, by loosening a screw thread 72, remove the pulsator 68 made of synthetic resin from a dehydration tack 66, and transport to the recovery place of synthetic resin.

[0050] (g) As shown in drawing 10, by loosening a screw thread 73, remove a motor 67 from the outside tub 65, and transport to the recovery place of a motor.

[0051] (h) As shown in drawing 11, separate the dehydration tack 66 connected with the shaft of a motor, and the outside tub 65, and transport a tub 65 to the recovery place of synthetic resin the outside made of

synthetic resin.

(i) A dehydration tack 66 is decomposed. That is, as shown in drawing 12, by loosening a screw thread 75, balancing ring 66b which comes to enclose salt water with a synthetic resin case is removed from drum section 66a made from stainless steel, and it transports to the recovery place of synthetic resin. Subsequently, as shown in drawing 13, by loosening a screw thread 76, bottom plate 66c made from stainless steel is removed from drum section 66a, and it transports to a metaled recovery place.

[0052] It can carry out automatically, without troubling an operator's hand, without special knowledge also having demolition and classification of an assembly 1, as the operation gestalten 1-3 are mentioned as an example and explained above. That is, a disposal processor can only hold the recycling equipments 2 and 2A and 2B which were mentioned above, and can perform quickly and easily demolition of products, such as various electrical machinery and apparatus and a machine device, and the disassembled classification of parts. Therefore, the discarded product can be recycled now effectively without futility, the environmental pollution of destroying by fire like before as a result, or reclaiming land can be lost, and it can contribute now to environmental protection greatly.

[0053] In addition, this invention is not limited only to the above-mentioned operation gestalt, and can consider various application and deformation.

(1) the identification number as recycling information written to the assembly 1 in the above-mentioned operation gestalt 2 -- for example, it reads using an optical reader and can be made to input to a control unit 20. In this case, an identification number can be made into the gestalt of a bar code like the above-mentioned operation gestalt 1.

(2) Although only the identification number is made into the index, you may make it add a manufacture maker, a product kind, etc. to the memory of recycling equipment 2A as an index in the above-mentioned operation gestalt 2. In this case, the thing of a manufacture maker of what can also perform demolition, a classification, etc. now automatically regardless of the assembly 1 which serves as a candidate for recycling as recycling equipment 2A.

(3) the \*\* which does not make memory 13 carry in an assembly 1 purposely in the above-mentioned operation gestalt 3 -- a part of existing memory -- a field can be made to memorize recycling information

(4) Although the thing in which have with a working robot 4 and made it make a demolition and classifying which classifies part each which was disassembled according to a material perform continuously is illustrated with the above-mentioned operation gestalten 1-3, the thing to which omit classifying and made it make only a demolition perform can also be included as one of the operation gestalten of this invention.

[0054]

[Effect of the Invention] It can carry out automatically, without troubling an operator's hand, without also having the special knowledge about demolition or a classification, when classifying the parts which disassembled for recycling, the discarded products, i.e.; the assemblies, such as various electrical machinery and apparatus and a machine device, or were disassembled according to the claim 1 of this invention, or 12.

[0055] The disposal processor which collects the discarded assemblies in short can only hold the recycling equipment of this invention, and can perform now quickly and easily demolition of products, such as various electrical machinery and apparatus and a machine device, and the disassembled classification of parts.

[0056] Therefore, the discarded product can be recycled now effectively without futility, the action which leads to the environmental pollution of destroying by fire like before as a result, or reclaiming land can be lost, and it can contribute now to environmental protection greatly.

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